

example, the crown temperatures or the quality of the glass produced.

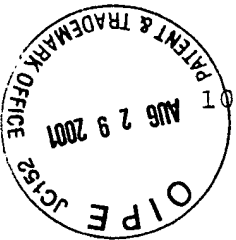
According to a second embodiment of the control device forming the subject of the present invention, this device furthermore includes a learning or computing device which is used during the learning phase of the neural- and/or fuzzy-type predictive system, i.e. during the phase of acquisition of the operating laws of the furnace. According to the invention, this learning, determining or computing device uses a computer model of the numerical-model type making it possible to define the laws governing the operation of the furnace, either from the learning phase of this predictive system, on the actual furnace, or by simulating the operation of the furnace using a mathematical model.

According to a preferred embodiment of the device forming the subject of the invention, this device furthermore includes a means for the acquisition and processing of the image of the inside of the furnace, operating in the visible, infrared or other spectrum, the said means possibly consisting of a system of video cameras positioned in the furnace in order to observe zones corresponding to a phenomenon relating to the melting and/or to the refining of the glass, the images thus obtained then being processed so as to obtain information relating to the observed phenomenon, this information being shaped for the purpose of being introduced as input data for the furnace control algorithm so as to monitor and control the observed phenomenon.

Other features and advantages of the present invention will emerge from the description given below with reference to the appended drawing which illustrates one embodiment thereof, given by way of example and devoid of any limiting character.

In the drawing:

- Figure 1 is a diagrammatic view, in perspective with partial cut-away, showing an example



conditions in which the melting and/or refining of the glass composition inside the furnace is/are taking place.

5 It follows from this empiricism that the principle on which to make decisions about actions to be taken with regard to a given situation in the furnace is difficult to formalize.

10 To solve this problem, operators generally draw up tables giving the status of all the measurable parameters of the furnace, in a given production configuration, so as to try to reproduce these parameters in a similar production situation. The number of parameters involved and the lack of knowledge about their relationship or interactions make this operation complicated during steady operation of the furnace. It is even more difficult during transient phases, such as a change of production or a change of colour, for example. Thus it may be imagined that a glass furnace can only be controlled by skilled operators with a great deal of experience.

20 The decisions taken therefore often depend on the experience or common practices of each operator and it follows that any generalization of the furnace control principles is extremely difficult. The operators, in their control of the furnace, work to within a safety factor with respect to the optimum operating conditions so as not to risk degrading the quality of the glass, this procedure limiting the efficiency or performance of the furnace.

30 The manual mode of controlling the glass furnace proves even more limited when managing the transient phases which correspond to changes in tonnage of the furnace or to changes in the type or colour of the glass, or other such changes.

35 Reference will now be made to Figure 1 of the appended drawings, which shows, diagrammatically, in perspective and with partial cut-away, one embodiment of a glass melting furnace to which the present invention may be applied.